1. A method for producing a resonant cavity light emitting device, the method including:

arranging a seed gallium nitride crystal and a source material in a nitrogen-containing superheated fluid, the nitrogen-containing superheated fluid providing a medium for mass transport of gallium nitride precursors between the seed gallium nitride crystal and the source material;

preparing a surface of the seed gallium nitride crystal, the preparing including applying a first thermal profile between the seed gallium nitride crystal and the source material while the seed gallium nitride crystal and the source material are arranged in the nitrogen-containing superheated fluid;

growing gallium nitride material on the prepared surface of the seed gallium nitride crystal, the growing including applying a second thermal profile which is different from the first thermal profile between the seed gallium nitride crystal and the source material while the seed gallium nitride crystal and the source material are arranged in the nitrogen-containing superheated fluid, said growing producing a single-crystal gallium nitride substrate; and

depositing a stack of group III-nitride layers on the single-crystal gallium nitride substrate, the stack including a first mirror sub-stack and an active region adapted for fabrication into one or more resonant cavity light emitting devices.

2. The method as set forth in claim 1, wherein the preparing of the surface of the seed gallium nitride crystal includes:

etching the seed gallium nitride crystal.

3. The method as set forth in claim 1, wherein the preparing of the surface of the seed gallium nitride crystal includes:

applying the first thermal profile to effect a growing of gallium nitride crystal on the seed gallium nitride crystal at a growth rate that is slower than a growth rate effected by the applying of the second thermal profile.

4. The method as set forth in claim 1, further including:

transitioning between the first and second thermal profiles over a selected time interval to produce an increasing growth rate of gallium nitride on the seed gallium nitride crystal over the selected time interval.

5. The method as set forth in claim 1, wherein the first and second thermal profiles have temperature gradients of opposite direction.

6. The method as set forth in claim 1, further including:

arranging an ammonium fluoride mineralizer in the nitrogen-containing superheated fluid for promoting dissolving of gallium nitride into the nitrogen-containing superheated fluid during the preparing and growing.

7. The method as set forth in claim 6, wherein:

the first thermal profile includes a positive temperature gradient directed from the seed gallium nitride crystal to the source material; and

the second thermal profile includes a negative temperature gradient directed from the seed gallium nitride crystal to the source material.

8. The method as set forth in claim 6, wherein:

a temperature difference between the seed gallium nitride crystal and the source material is larger in the second thermal profile than in the first thermal profile.

9. The method as set forth in claim 1, further including:

arranging an ammonium chloride mineralizer in the nitrogen-containing superheated fluid for promoting dissolving of gallium nitride into the nitrogen-containing superheated fluid during the preparing and growing, wherein the second thermal profile has a positive temperature gradient directed from the seed gallium nitride crystal to the source material.

10. The method as set forth in claim 1, further including:

arranging a mineralizer in the nitrogen-containing superheated fluid, the mineralizer enhancing dissolution of gallium nitride into the nitrogen-containing superheated fluid.

11. The method as set forth in claim 1, further including:

arranging a luminescent dopant comprising at least one of a transition metal and a rare earth metal in one of the nitrogen-containing superheated fluid and the gallium nitride source material.

12. The method as set forth in claim 1, further including:

subsequent to the depositing of the stack, fabricating a plurality of resonant cavity light emitting devices thereon.

13. The method as set forth in claim 12, further including:

dicing the single-crystal gallium nitride substrate to separate the plurality of resonant cavity light emitting devices.

14. The method as set forth in claim 1, further including:

prior to the depositing of the stack, slicing the single-crystal gallium nitride substrate into a plurality of generally planar wafers, wherein the depositing of the stack includes depositing the stack on at least one of the generally planar wafers.

15. The method as set forth in claim 14, wherein the slicing produces a plurality of generally planar (0001) oriented wafers each having (0001) and $(000\underline{1})$ oriented surfaces on opposite sides of the wafer, the method further including:

polishing one of the (0001) oriented surface and the $(000\underline{1})$ oriented surface of a selected (0001) oriented wafer, the stack being deposited on the polished surface.

16. The method as set forth in claim 14, wherein the slicing produces a plurality of generally planar $(1\underline{1}00)$ oriented wafers.

17. The method as set forth in claim 14, wherein the slicing produces a plurality of generally planar $(11\underline{2}0)$ oriented wafers.

18. A resonant cavity light emitting device including:

a stack of group III-nitride layers substantially free of tilt-boundaries and having a dislocation density less than 10^4 cm^{-2}, the stack including a first mirror sub-stack defining a distributed Bragg reflector and an active region; and

a mirror cooperating with the first mirror sub-stack to define a resonant cavity inside of which the active region is disposed.

19. The resonant cavity light emitting device as set forth in claim 18, wherein the stack of group III-nitride layers have a minimum lateral dimension greater than 0.1 cm.

20. The resonant cavity light emitting device as set forth in claim 18, wherein the mirror includes:

a reflective stack of one or more layers disposed over a surface of the stack of group III-nitride layers distal from the first mirror sub-stack.

21. The resonant cavity light emitting device as set forth in claim 20, wherein the reflective stack includes:

a reflective metal layer.

22. The resonant cavity light emitting device as set forth in claim 21, further including:

a discontinuous electrode disposed on the surface of the stack of group III-nitride layers distal from the first mirror sub-stack, the discontinuous electrode being in electrical contact with the stack of group III-nitride layers.

23. The resonant cavity light emitting device as set forth in claim 18, wherein the mirror includes:

a second mirror sub-stack of group III-nitride layers defining a distributed Bragg reflector.

24. The resonant cavity light emitting device as set forth in claim 18, wherein the mirror includes:

a dielectric stack defining a distributed Bragg reflector.

25. The resonant cavity light emitting device as set forth in claim 18, wherein the stack of group III-nitride layers has a dislocation density less than 10^3 cm^{-2}.

26. The resonant cavity light emitting device as set forth in claim 18, wherein the stack of group III-nitride layers has a dislocation density less than 100 cm^{-2}.

27. The resonant cavity light emitting device as set forth in claim 18, wherein the stack of group III-nitride layers include trenches formed therein, each trench extending at least through the active region to define laterally spaced islands of the active region, portions of the stack of group III-nitride layers extending between the laterally spaced islands of the active region containing substantially no edge dislocation arrays.

28. The resonant cavity light emitting device as set forth in claim 18, wherein the stack of group III-nitride layers has one of a $(11\underline{2}0)$ oriented principal surface and a $(1\underline{1}00)$ oriented principal surface.

29. The resonant cavity light emitting device as set forth in claim 18, wherein the stack of group III-nitride layers has one of a (0001) oriented principal surface and a $(000\underline{1})$ oriented principal surface.

30. The resonant cavity light emitting device as set forth in claim 18, wherein the active region of the stack of group III-nitride layers includes:

a region of indium-containing quantum dots.

31. The resonant cavity light emitting device as set forth in claim 18, further including:

a single-crystal gallium nitride substrate substantially free of tilt-boundaries on which the stack of group III-nitride layers is disposed, the single-crystal gallium nitride substrate having a dislocation density less than 10^4 cm^{-2}.

32. The resonant cavity light emitting device as set forth in claim 31, wherein the single-crystal gallium nitride substrate has an optical absorption coefficient that is generally less than 5 cm^{-1} over a spectral range between 465 nm and 700 nm.

33. The resonant cavity light emitting device as set forth in claim 32, wherein the single-crystal gallium nitride substrate is electrically conductive.

34. The resonant cavity light emitting device as set forth in claim 33, wherein the electrically conductive single-crystal gallium nitride substrate has a resistivity of less than 10 ohm-cm.

35. A resonant cavity light emitting device including:

a stack of group III-nitride layers including an active region;

a single-crystal gallium nitride substrate substantially free of tilt-boundaries on which the stack of group III-nitride layers is disposed, the single-crystal gallium nitride substrate having a dislocation density less than 10^4 cm^{-2}; and

first and second mirrors defining a resonant cavity inside of which the active region is disposed, light produced by the active region resonating in the resonant cavity.

36. The resonant cavity light emitting device as set forth in claim 35, further including:

a luminescent material or dopant disposed on or in the single crystal gallium nitride substrate that produces luminescence light of wavelength in a range between 300 nm and 1000 nm inclusive, the luminescence light being spectrally different from the light produced by the active region.

37. The resonant cavity light emitting device as set forth in claim 36, wherein the luminescent material or dopant comprises at least one of Ti, V, Cr, Mn, Fe, Co, or a rare earth metal.

38. The resonant cavity light emitting device as set forth in claim 35, further including:

a third mirror cooperating with one of the first and second mirrors to define a second resonant cavity, the luminescence light resonating in the second resonant cavity.

39. The resonant cavity light emitting device as set forth in claim 38, wherein each of the first, second, and third mirrors is independently selected from a group consisting of:

a semiconductor distributed Bragg reflector defined by the stack of group III-nitride layers,

a mixed oxide distributed Bragg reflector, and

a metallic or partially-metallized mirror.

40. A resonant cavity light emitting device including:

a single-crystal gallium nitride substrate having a characteristic absorption peak at about 3175 cm^{-1} with an absorbance per unit thickness greater than about 0.01 cm^{-1};

a stack of group III-nitride layers disposed on the single-crystal gallium nitride substrate, the stack including a first mirror sub-stack and an active region; and

a mirror cooperating with the first mirror sub-stack to define a resonant cavity inside of which the active region is disposed.

41. The resonant cavity light emitting device of claim 40, wherein the single-crystal gallium nitride substrate has a fluorine concentration greater than about 0.04 ppm.

42. The resonant cavity light emitting device of claim 41, wherein the single-crystal gallium nitride substrate is substantially free of tilt-boundaries and has a dislocation density less than 100 cm^{-2}.

43. A method for producing a resonant cavity light emitting device, the method including:

arranging a seed gallium nitride crystal and a source material in a nitrogen-containing superheated fluid disposed in a sealed container disposed in a multiple-zone furnace;

growing gallium nitride material on the seed gallium nitride crystal by mass transport from the source material to the seed gallium nitride crystal through the nitrogen-containing superheated fluid, said growing producing a single-crystal gallium nitride substrate secured to the seed gallium nitride crystal, said growing including applying a temporally varying thermal gradient between the seed gallium nitride crystal and the source material to produce an increasing growth rate during at least a portion of the growing; and

depositing a stack of group III-nitride layers on the single-crystal gallium nitride substrate, the stack including a first mirror sub-stack and an active region adapted for fabrication into one or more resonant cavity light emitting devices.

44. The method as set forth in claim 43, wherein the applying of a temporally varying thermal gradient to produce an increasing growth rate during at least a portion of the growing includes:

reversing a direction of the thermal gradient during the temporal varying.

45. The method as set forth in claim 43, wherein the depositing of the stack of group III-nitride layers on the single-crystal gallium nitride substrate includes:

depositing the stack of group III-nitride layers by one of metal-organic chemical vapor deposition and molecular beam epitaxy.

46. The method as set forth in claim 43, further including:

slicing the single-crystal gallium nitride substrate into a plurality of wafers; and

polishing a surface of a selected wafer, the depositing of the stack of group III-nitride layers being performed on the polished surface of the selected wafer.

47. The method as set forth in claim 43, wherein the depositing of the stack of group III-nitride layers on the single-crystal gallium nitride substrate includes:

depositing a second mirror sub-stack, the first mirror sub-stack and the second mirror sub-stack defining a resonant cavity surrounding the active region.

48. The method as set forth in claim 43, further including:

depositing a reflector of a material other than a group III-nitride material on the stack, the first mirror sub-stack and the reflector defining a resonant cavity surrounding the active region.

49. The method as set forth in claim 43, further including:

processing the stack of group III-nitride layers to define a plurality of light emitting devices secured to the single-crystal gallium nitride substrate, the plurality of light emitting devices being selected from a group consisting of:

a plurality of resonant cavity light emitting diodes, and

a plurality of vertical cavity surface emitting lasers.